Examiner's Response to Arguments

The Examiner states that arguments filed 2/12/03 have been fully considered, but they are not persuasive.

The Examiner states that arguments with respect to claims 1 and 2 have been considered but are moot in view of the new grounds of rejection.

The Examiner cites to several new references in addition to maintaining previous rejections citing Sakumoto and Oida. The reference to Yamaguchi has apparently been removed.

Claim Rejections - 35 U.S.C. § 102

Claim 3 has been rejected under 35 U.S.C. 102(b) as assertedly being anticipated by Hanneman et al.(U.S. Patent 5,436,061) as evidenced by High Performance Films.

Hanneman is a newly cited reference[1]. The Examiner states that Hanneman discloses an adhesive tape made from Kapton with an adhesive which can have an adhesive strength as low as 9-12 gf/mm but does not specifically state the thermal shrinkage. The Examiner states that High Performance Films discloses that Kapton has thermal shrinkage of 0.10% at 200°C. Thus, the Examiner reasons that one in the art would understand the film of Hanneman et al. would have a shrinkage of less than 3%.

The Examiner further states that this film is capable of being used in the method of claim 1. The Examiner states that Applicants are only claiming the adhesive film and not its

[1] The Examiner failed to provide us a copy of the reference to Hanneman et al. The Examiner also failed to annotate the Form PTO-892 Notice of References Cited with Hanneman et al. (Hanneman et

...(footnote continued)

combination with the lead frame. Therefore, the Examiner reasons that the reference film need only be capable of use in claim 1, not intended for use in claim 1.

Applicants respond as follows.

Applicants traverse the rejection on the basis of distinctions between Hanneman and the presently claimed invention. Hanneman's Tables I, II and IV disclose certain low adhesion strength values, for example, 8 oz/in in Table I and 12 oz/in in Table II, but these values do not equate to the range "as low as 9-12 gf/mm" as the Examiner asserts. Hanneman measures adhesion with a Keil Tester at a peel angle of 180 degrees at a rate of 12 inches/minute in units of ounces per inch (oz/in) (see col. 9, lines 11-22). This unit of measurement is different from Applicants'.

Referring to conversion factors, since 1 oz is 28.35 g, the conversion of the lowest value of 8 oz/in regardless of temperature gives about 179 gf/20 mm (8 oz/in = 8 x 28.35 g/2.54 cm = 8 x 11.16 g/cm = 8 x 11.16 g/10 mm = 8 x 22.32 gf/20 mm = 179 gf/20 mm). The converted value of from 9 to 12 gf/20 mm given by the Examiner cannot be appreciated from Hanneman.

Applicants assert that the measured value in Hanneman does not fall within the range of not greater than 400 gf/20 mm, which is a limitation of the present claim 3. Since there is a difference in temperature conditions between the present invention and Hanneman, the converted value cited doesn't substantially fall within the range of the present claim 3.

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al. was not first cited or disclosed by Applicants.) The Examiner is requested to provide a corrected Form PTO-892.

Applicants also point out to the Examiner that the particular temperatures recited in claim 3 are different from the temperatures disclosed in Hanneman et al. Whereas the Applicants claim a preferred embodiment of a PSA tape having a PSA strength of 400 gf/20 mm or less at 23° C after the adhesive tape being heated at 180° C, Hanneman discloses a PSA strength of, e.g, of 8 and 12 oz/in (or higher up to 80 oz/in) at 80° C after the adhesive tape has been cured at 130° for 4 minutes, extracted with CO_2 under supercritical conditions, cooled and degassed (See Hanneman, col. 9, lines 11-22; col. 10, lines 48-61; and Tables I and II). The different experimental conditions negate the Examiner's attempted comparison of Hanneman's PSA strengths with Applicants' claimed PSA strength range of 400 g/20 mm or less.

According to the present invention, the material is heated to a temperature of 180°C, and then allowed to cool to a temperature of 23°C (ordinary temperature) where measurement is then conducted. In contrast, the measured value used in Hanneman is obtained with the material in a 80°C atmosphere after being heated to a temperature of 130°C. The present invention and that of Hanneman differ in heating time but also differ greatly in two other points: (A) highest heating temperature and (B) measurement temperature. In particular, the difference in (B) measurement temperature definitely has a great effect on this argument. It is well known that since a polymer material such as adhesive softens as the temperature rises, the adhesive strength itself decreases with the measurement temperature. Though depending on its kind, an ordinary silicone-based adhesive shows an adhesive strength drop to about 1/10 to 1/3 of that at ordinary temperature when measured at a temperature of the order of 80°C. Accordingly, Applicants assert that the adhesion strength value measured at a temperature of the order of 80°C as employed in

Hanneman would be several times greater than the measurement when conducted at a temperature of 23 °C.

The reason why the adhesive strength of the present claim 3 is defined to be not greater than 400 gf/20 mm is that this order of adhesive strength is the maximum allowable level at which the molded article can be easily peeled off the adhesive tape. When the adhesive strength of the adhesive tape ranges from 500 gf/20 mm to 1,000 gf/20 mm, which range corresponds to several multiples of 179 gf/20 mm, the finished PKG can be easily destroyed rather than easily peeled off the adhesive tape when peeled by force. Accordingly, the adhesive strength defined in Hanneman greatly differs at least from that intended in the present invention.

In addition to the difference in (B) measurement temperature, which is so great in itself, the (A) highest heating temperature also has a strong effect on this argument for distinction. As previously mentioned, as the temperature rises, an adhesive softens. Therefore, the adhesive adapts itself to the adherend with the rise of the highest heating temperature. In other words, the adhesive adapts itself more to the adherend when the heating temperature rises somewhat. Since the adhesive adapts itself more to the adherend when heated to a temperature of 180°C than when heated to a temperature of 130°C, it is natural that the adhesive exhibits a higher adhesive strength when heated to a temperature of 180°C than when heated to a temperature of 130°C. In other words, it can be normally thought that the adhesion strength value measured when heated to a temperature of 130°C can still rise to a value higher than previously defined if measured at a temperature of 180°C.

Accordingly, it can be judged that, in Hanneman et al, the value measured at a temperature of 23°C after substantially heating to a temperature of 180°C doesn't fall below 400 gf/20 mm.

In general, in ordinary transfer molding, resin encapsulation is conducted at a temperature of from 170°C to 180°C to melt and fluidize an epoxy resin. Therefore, evaluation at a temperature after being heated to 180°C as claimed in the present application is essential, and the discussion of characteristics at a temperature of 130°C as in Hanneman gives no significant figures for the purpose of mold masking.

Accordingly, for the foregoing reasons, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b). Clearly, each element of claim 3 is not described by the reference.

B. **Claim 3** has been rejected under 35 U.S.C. 102(b) as assertedly being anticipated by Sakumoto et al for the reasons given in the Office Action.

The Examiner states that Sakumoto et al discloses an adhesive tape for use with electrical components with a thermal shrinkage of less than 0.15% in the resin deposition temperature range. The tape is assertedly attached to a lead frame used with semiconductors which are sealed with resin after the chips are mounted. Although the Examiner recognizes that the tape is not specifically disclosed as pressure sensitive, the Examiner asserts that the tape is applied without the use of heat, but simply via attachment. The Examiner states that one in the art would understand that this means the tape is applied via pressure. The reference also assertedly

discloses that the tape has an adhesive strength of not less than 267 gf/20 mm. Therefore, the Examiner reasons that the reference discloses adhesive strengths of 267 gf/20 mm.

The Examiner further states that this film is capable of being used in the method of claim 1. The Examiner states that Applicants are only claiming the adhesive film and not its combination with the lead frame. Therefore, the Examiner reasons that the reference film need only be capable of use in claim 1, not intended for use in claim 1.

Applicants respond as follows.

Applicants traverse the rejection by asserting that the present invention of claim 3 is distinguished from the disclosure of Sakumoto. The Examiner apparently asserts a converted adhesive strength of "not less than 267 gf/20 mm" from the disclosed range in Sakumoto of "not lower than 200 g/1.5 cm" (See Sakumoto, Col. 5, lines 25-27).

Applicants point out that Sakumoto's adhesive properties must be considered given that Sakumoto's adhesive films have apparently been preheated "by passing the organic films through two opposing infrared heaters or passing between a plurality of heated rollers heated at a temperature of from 280° to 360° C. for from 1 to 10 minutes..." (See Sakumoto col. 8, lines 34-44).

Numerical conversion can be understood by itself. However, because silicone is a polymer material, it normally begins to decompose at a temperature of from about 270°C to 280°C and then can undergo carbonization or combustion at a temperature of higher than 300°C. In other words, when heated to a temperature of higher than the destruction temperature of

adhesives, which ranges from 280°C to 360°C, even an adhesive having a high heat resistance loses its inherent adhesiveness and thus shows a drop of adhesive strength.

Accordingly, the value exemplified in Sakumoto cannot be unconditionally converted to adhesive strength measured after heating to a temperature of 180°C. Therefore, it cannot be judged that Sakumoto describes a product having adhesive strength measured after heating to a temperature of 180°C as defined in the present application that falls below 400 gf/20 mm.

It cannot be denied that when the components of the tape are destroyed, decomposed gas can be generated violently, making it likely that PKG can be secondarily contaminated and the decomposed adhesive components can be left behind. Thus, the purpose of tape for use in the step of producing PKG cannot be accomplished.

Accordingly, for the foregoing reasons, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(b).

Claim Rejections - 35 U.S.C. § 103

Claims 1 and 4 have been rejected under 35 U.S.C. 103(a) as assertedly being unpatentable over Mostafazadeh et al.(U.S. Patent 5,894,108) for the reasons given in the Office Action.

Claims 1 and 4 have been rejected under 35 U.S.C. 103(a) as assertedly being unpatentable over Mostafazadeh et al. in view of Lin et al.(U.S. Patent 5,273,938) and as evidenced by High Performance Films.

Claim 2 has been rejected under 35 U.S.C. 103(a) as assertedly being unpatentable over Mostafazadeh in view of Lin et al. and High Performance Films as applied to claim 1 above, and further in view of Oida et al. (WO 98/35382) (U.S. Patent 6,291,274)

Claims 3 and 5 have been rejected under 35 U.S.C. 103(a) as assertedly being unpatentable over Mostafazadeh et al. in view of Lin et al. and High Performance Films as applied to claims 1 and 4 above and further in view of Nakayama et al.(U.S. Patent 5,538,771).

Applicants respond as follows.

Applicants use an adhesive tape for the purposes of providing a method of encapsulating a semiconductor chip with a resin which achieves improved efficiency of resin encapsulating while always preventing breakage of bonding parts.

Mostafazadeh is directed to an adhesive tape for the purpose of supporting the die and lead frame, and therefore the use of the adhesive tape of the cited reference is different from that of the present invention which is for providing a method of encapsulating a semiconductor chip with a resin.

In addition, Mostafazadeh does not disclose the requirement of "having a thermal shrinkage of 3% or less on resin encapsulating". The importance of having this unobvious requirement is shown by the Comparative Example 2 in the present specification on page 10.

The combination of Mostafazadeh with these secondary prior art references fails to overcome Mostafazadeh's deficiencies. Applicants respectfully submit that the present claimed invention is not rendered *prima facie* obvious by the cited references.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a).

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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